

5 1. A wheel set for a rail vehicle comprising a pair of wheels connected by an axle and a vibration absorbing device comprising a mass resiliently mounted for circumferential oscillatory movement with respect to the wheel set and a spring element acting circumferentially between the mass and the wheel set, such that the mass can oscillate at the resonant frequency of torsional vibrations of the wheel/axle system and wherein damping of the oscillatory movement is provided by a friction determining surface between mutually contacting surfaces of the wheel set and the mass.

10 2. The wheel set according to any of the preceding claims, wherein the vibration absorbing device is mounted on the wheel.

15 3. The wheel set according to any of the preceding claims, wherein the mass of the vibration absorbing device comprises at least a segment of an annular ring concentrically mounted with respect to the axle.

20 4. The wheel set according to claim 3, wherein the ring segment is mounted to the wheel by the spring element.

25 5. The wheel set according to claim 4, wherein the wheel is provided with a bore and the spring element comprises a centering sleeve for insertion in the bore and a spring plate for engaging with the ring segment.

30 6. The wheel set according to claim 4, wherein the wheel is provided with a bore and the ring segment is provided with a counter bore and the spring element comprises a spring sleeve which inserts into both the bore and the counter bore.

7. The wheel set according to claim 5, wherein the spring sleeve includes a longitudinal slot, the width of which determines the maximum amplitude of oscillation of the ring segment with respect to the wheel.

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8. The wheel set according to any of claims 3 to 7, wherein the wheel comprises a flange and a pair of ring segments are mounted on opposite facing sides of the wheel and connected together through the flange to oscillate together.

10 9. The wheel set according to claim 8, wherein the wheel is provided with a bore through the flange and the spring sleeve passes through the bore and inserts into counter bores formed in both ring segments.

15 10. The wheel set according to claim 9, wherein the ring segments are connected together by a fastening element passing through the spring sleeve.

11. The wheel set according to claim 10, wherein the fastening element comprises a compression sleeve and a tensioning bolt, the compression sleeve being of a length to support between the ring segments through the flange whereby on tensioning, the 20 pre-stress of the bolt may be taken by the compression sleeve to reduce the contact force between the ring segments and the flange.

12. The wheel set according to any of claims 3 to 11, in which the ring segment consists of a brake disk.

25 13. The wheel set according to claim any of claims 5 to 11, in which the ring segment consists of a brake disk and at least one of either the bore or the counter bore is elliptical or oval and radially oriented to allow for thermal expansion of the brake disk.

30 14. The wheel set according to any of claims 3 to 11, wherein the mass is mounted to the wheel adjacent to its circumference.

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5 15. The wheel set according to any of claims 1 or 2, wherein the vibration absorbing device comprises part of the wheel.

10 16. The wheel set according to claim 15, wherein the mass of the vibration absorbing device is provided by the rim of the wheel which is resiliently mounted with respect to the remainder of the wheel.

15 17. The wheel set according to claim 1, wherein the vibration absorbing device is mounted on the axle adjacent to the wheel.

20 18. The wheel set according to any preceding claim, wherein a vibration absorbing device is mounted on or adjacent to both wheels.

19. The wheel set according to any of the preceding claims further comprising a drive engaged to cause rotation of the axle.

25 20. The wheel set according to claim 19 wherein the drive engages the axle at or adjacent to the mid point thereof.

21. The wheel set according to claim 19 or 20 further comprising a control system, the control system being adapted in use to register and control slip between the wheels and the rail.

30 22. A rail vehicle comprising at least one wheel set according to any of claims 1 to 21.

23. A method of preventing or reducing torsional vibrations in a wheel set of a rail vehicle comprising a pair of wheels connected by an axle, the method comprising determining the resonant frequency of torsional vibrations of the wheel/axle system and resiliently mounting a mass on the wheel set using a spring element acting circumferentially between the wheel set and the mass and a friction determining

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5 surface between mutually contacting surfaces of the wheel set and the mass, the mass and its resilient mounting being selected to oscillate at or near that resonant frequency.

24. The method of claim 23 wherein the mass is mounted according to any of claims 1  
10 to 21.

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